

We Claim:

1. A method for fabricating a semiconductor package comprising:

5 providing a substrate having a first surface with a die attach area thereon;

depositing a photoimageable mask material on the first surface and on the die attach area;

10 exposing and developing the mask material to form a mask having an opening on the die attach area;

placing a semiconductor die in the opening; and bonding the die to the die attach area.

15 2. The method of claim 1 further comprising exposing and developing the mask material to form via openings in the mask for bonding solder balls to the substrate.

20 3. The method of claim 1 wherein bonding the die comprises forming an adhesive layer between the die and the substrate.

25 4. A method for fabricating a semiconductor package comprising:

providing a substrate having a first surface;

25 depositing a photoimageable mask material on the substrate, the mask material substantially covering the first surface;

30 exposing and developing the mask material to form a mask having an opening which defines a die attach area on the first surface; and

bonding a semiconductor die to the die attach area by forming an adhesive layer between the die and substrate.

5. The method of claim 4 further comprising depositing the mask material on a second surface of the substrate and exposing and developing the mask material to form a second mask on the second surface.

6. The method of claim 4 further comprising providing the substrate with a plurality of conductors and forming via openings through the mask material to the conductors for bonding solder balls thereto.

7. A method for fabricating a semiconductor package comprising:

providing a substrate having a first surface and a second surface;

providing a pattern of conductors on the first surface;

forming a first mask on the first surface comprising a plurality of via openings to the conductors;

forming a second mask on the second surface comprising an opening therein defining a die attach area on the substrate; and

attaching a semiconductor die directly to the die attach area.

8. The method of claim 7 further comprising wire bonding the die to the conductors.

9. The method of claim 7 wherein the first mask and the second mask comprise a same photoimageable material.

10. A method for fabricating a semiconductor package comprising:

providing a substrate having a first surface and a second surface;

providing a pattern of conductors on the first surface;

providing a die attach area on the second surface;

depositing a photoimageable mask material on the  
5 first surface and on the conductors;

depositing the photoimageable mask material on the second surface and on the die attach area;

exposing and developing the mask material on the first surface to form a first mask having a plurality of via  
10 openings to the conductors;

exposing and developing the mask material on the second surface to form a second mask having an opening to the die attach area; and

attaching a semiconductor die directly to the die  
15 attach area.

11. The method of claim 10 further comprising providing the substrate with a second opening and wire bonding wires through the second opening to the die and to the conductors.  
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12. The method of claim 10 further comprising encapsulating the die in an encapsulating resin.

13. The method of claim 10 further comprising placing  
25 solder balls in the via openings and bonding the solder balls to ball bonding pads on the conductors.

14. The method of claim 10 further comprising wire bonding the die to the conductors.  
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15. A method for fabricating a semiconductor package comprising:

providing a substrate having a first surface and a second surface;

providing a pattern of conductors on the first surface, the conductors comprising a plurality of ball bonding pads;

5 substantially covering the first surface and the second surface with a photoimageable mask material;

exposing and developing the mask material on the first surface to form a first mask having a plurality of via openings to the ball bonding pads;

10 exposing and developing the mask material on the second surface to form a second mask having an opening to the substrate defining a die attach area;

attaching a semiconductor die directly to the die attach area; and

15 placing solder balls in the via openings and bonding the balls to the ball bonding pads.

16. The method of claim 15 further comprising providing the conductors with wire bonding pads and wire bonding the die to the wire bonding pads.

20 17. The method of claim 15 wherein the mask material comprises a resist.

25 18. The method of claim 15 wherein attaching the die comprises forming an adhesive layer between the die and substrate.

30 19. The method of claim 15 further comprising encapsulating the die in an encapsulating resin.

20. The method of claim 15 wherein the substrate includes a second opening in the die attach area and the die is placed face down on the substrate and wire bonded through the second opening to the conductors.

21. A semiconductor lead frame comprising:  
a substrate having a first surface and a second surface;  
a plurality of conductors formed on the first surface;  
5 a first mask formed on the first surface comprising a plurality of via openings to the conductors; and  
a second mask formed on the second surface comprising an opening defining a die attach area on the substrate.

10 22. The lead frame of claim 21 further comprising a plurality of die bonding pads on the conductors aligned with the via openings.

15 23. The lead frame of claim 21 further comprising a second opening through the substrate for wire bonding the die to the conductors.

20 24. A substrate for fabricating a semiconductor package comprising:

a plurality of conductors formed on a first surface of the substrate, the conductors comprising a plurality of ball bonding pads;

a first mask formed on the first surface comprising a plurality of via openings to the ball bonding pads; and

25 a second mask substantially covering a second surface of the substrate, and including an opening there through defining a die attach area on the substrate.

30 25. The substrate of claim 24 further comprising a semiconductor die adhesively bonded to the die attach area.

26. The substrate of claim 25 wherein the die attach area has an outline corresponding to an outline of the die.

27. A substrate for a semiconductor package comprising:  
a first surface on the substrate and an opposing second  
surface on the substrate, the second surface having a die  
attach area thereon;

5 a plurality of conductors formed on the first surface,  
each conductor comprising a wire bonding pad and a ball  
bonding pad;

10 a first mask formed on the first surface comprising a  
plurality of via openings aligned with selected ball bonding  
pads on the conductors and a first opening exposing selected  
wire bonding pads on the conductors; and

a second mask substantially covering the second surface  
and including a second opening there through to the die  
attach area.

15 28. The substrate of claim 27 wherein the substrate  
comprises a third opening there through for wire bonding a  
die to the wire bonding pads.

20 29. The substrate of claim 27 wherein the first mask  
and the second mask comprise a photoimageable dielectric  
material.

25 30. A semiconductor package comprising:

a substrate having a first surface and a second surface;  
a plurality of conductors formed on the first surface,  
the conductors comprising a plurality of ball bonding pads;

a first mask formed on the first surface comprising a  
plurality of via openings to the ball bonding pads;

30 a second mask substantially covering the second surface  
and including an opening there through defining a die attach  
area on the substrate;

a semiconductor die attached to the die attach area in  
electrical communication with the conductors; and

a plurality of solder balls placed in the via openings and bonded to the ball bonding pads.

31. The package of claim 30 further comprising an encapsulating resin on the substrate encapsulating the die.

32. The package of claim 30 wherein the die is wire bonded to the conductors.

33. The package of claim 33 further comprising an adhesive layer attaching the die to the die attach area.

34. A semiconductor package comprising:

a substrate comprising a first surface and an opposing second surface having a die attach area thereon;

a plurality of conductors formed on the first surface, each conductor comprising a wire bonding pad and a ball bonding pad;

a first mask formed on the first surface comprising a plurality of via openings aligned with selected ball bonding pads on the conductors and a first opening exposing selected wire bonding pads on the conductors;

a second mask substantially covering the second surface and including a second opening there through to the die attach area;

a semiconductor die adhesively bonded to the die attach area and wire bonded to the conductors; and

an encapsulating resin formed on the die and substrate.

35. The package of claim 34 further comprising a third opening in the substrate for wire bonding the die to the conductors.

36. The package of claim 35 wherein the die is bonded face down to the die attach area.

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